ŦĬON PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

### (19) World Intellectual Property Organization International Bureau



#### (43) International Publication Date 9 August 2001 (09.08.2001)

#### **PCT**

## (10) International Publication Number WO 01/57867 A2

(51) International Patent Classification7:

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(81) Designated States (national): CN, JP.

(21) International Application Number:

PCT/EP01/01207

G11B 20/00

(22) International Filing Date: 5 February 2001 (05.02.2001)

(25) Filing Language:

**English** 

(26) Publication Language:

English

(30) Priority Data:

60/180,838 09/537,079 7 February 2000 (07.02.2000) US

28 March 2000 (28.03.2000) US Published:

NL, PT, SE, TR).

without international search report and to be republished upon receipt of that report

(84) Designated States (regional): European patent (AT, BE,

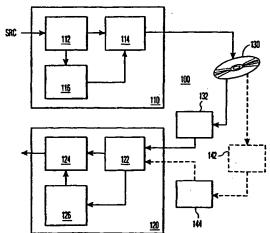
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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(54) Title: PROTECTING CONTENT FROM ILLICIT REPRODUCTION



(57) Abstract: A sufficient number of data items are selected (112) for inclusion in a data set so as to discourage a transmission of the entire set over a limited bandwidth communications path (130), such as the Internet. Each data item comprises one or more sections, which taken together constitute the complete data set. Each section of the data set is linked to another section of the data set, and each section's link is bound to the section via the use of one or more watermarks. Upon presentation of material for rendering, the presence of the entircty of the data set is verified (126) by ascertaining the presence of linked-to sections. For further security, the links between sections is formed by a random selection of each linked-to section. To verify that each linked-to section corresponds to the original section that was linked-to, each link contains an identifier of the linked-to section that can be used to determine that a retrieval of a linked-to section corresponds to the originally assigned linked-to section. If the identifier associated with the linked-to section does not properly match the presented linked-to section, a rendering of the data items of the data set is prevented. In a preferred embodiment, a closed linked list is formed, so that every section of the data set can be included in the verification process,

· Appendition Monthless Cantain the State of Charless (Admin) - Admin) - 建设定数 (Admin) - Admin) Protecting content from illicit reproduction

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1. Field of the Invention This invention relates primarily to the field of consumer electronics, and in particular to the protection of copy-protected content material.

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2. Description of Related Art

The illicit distribution of copyright material deprives the holder of the copyright legitimate royalties for this material, and could provide the supplier of this illicitly distributed material with gains that encourage continued illicit distributions. In light of the 10 ease of information transfer provided by the Internet, content material that is intended to be copy-protected, such as artistic renderings or other material having limited distribution rights, are susceptible to wide-scale illicit distribution. The MP3 format for storing and transmitting compressed audio files has made the wide-scale distribution of audio recordings feasible, because a 30 or 40 megabyte digital audio recording of a song can be compressed into a 3 or 4 megabyte MP3 file. Using a typical 56 kbps dial-up connection to the Internet, this MP3 file can be downloaded to a user's computer in a few minutes. Thus, a malicious party could read songs from an original and legitimate CD, encode the songs into MP3 format, and place the MP3 encoded song on the Internet for wide-scale illegitimate distribution. Alternatively, the malicious party could provide a direct dial-in service for downloading the MP3 encoded 20 song. The illicit copy of the MP3 encoded song can be subsequently rendered by software or hardware devices, or can be decompressed and stored onto a recordable CD for playback on a conventional CD player. Action Williams That has the in the con-

A number of schemes have been proposed for limiting the reproduction of copy-protected content material. The Secure Digital Music Initiative (SDMI) and others 25, advocate the use of "digital watermarks" to identify authorized content material. EP 0981901 "Embedding auxiliary data in a signal" published 1 March 2000 discloses a technique for watermarking electronic material. As in its paper watermark counterpart, a digital watermark is embedded in the content material so as to be detectable, but unobtrusive. An audio playback of a digital music recording containing a watermark, for example, will be

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substantially indistinguishable from a playback of the same recording without the watermark. A watermark detection device, however, is able to distinguish these two recordings based on the presence or absence of the watermark. Because some content material may not be copyprotected and hence may not contain a watermark, the absence of a watermark cannot be used to distinguish legitimate from illegitimate material. On the contrary, the absence of a watermark is indicative of content material that can be legitimately copied freely.

Other copy protection schemes are also available. For example, European patent EP0906700, "Method and system for transferring content information and supplemental information related thereto", published 7 April 1999 presents a technique for the protection of copyright material via the use of a watermark "ticket" that controls the number of times the protected material may be rendered.

An accurate reproduction of watermarked material will cause the watermark to be reproduced in the copy of the watermarked material. An inaccurate, or lossy reproduction of watermarked material, however, may not provide a reproduction of the watermark in the lossy copy of the material. A number of protection schemes, including those of the SDMI, have taken advantage of this characteristic of lossy reproduction to distinguish legitimate material from illegitimate material, based on the presence or absence of an appropriate watermark. In the SDMI scenario, two types of watermarks are defined: "robust" watermarks, and "fragile" watermarks. A robust watermark is one that is expected to survive a lossy reproduction that is designed to retain a substantial portion of the original content material, such as an MP3 encoding of an audio recording. That is, if the reproduction retains sufficient information to allow a reasonable rendering of the original recording, the robust watermark will also be retained. A fragile watermark, on the other hand, is one that is expected to be corrupted by a lossy reproduction or other illicit tampering.

In the SDMI scheme, the presence of a robust watermark indicates that the content material is copy protected, and the absence or corruption of a corresponding fragile watermark when a robust watermark is present indicates that the copy protected material has been tampered with in some manner. An SDMI compliant device is configured to refuse to render watermarked material with a corrupted watermark, or with a detected robust watermark but an absent fragile watermark, except if the corruption or absence of the watermark is justified by an "SDMI-certified" process, such as an SDMI compression of copy protected material for use on a portable player. For ease of reference and understanding, the term "render" is used herein to include any processing or transferring of the content material, such as playing, recording, converting, validating, storing, loading, and the like.

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the control of the medical energy the land out of the first survey of a confidence of the minimize the likelihood of forgery, the entirety parameter is based on a hash of a composite of section-specific identifiers. The referenced copending application also teaches the use of digitally signed certificates and other techniques that rely on cryptographic techniques, such THE HOLD OF BUT THE PROPERTY OF THE PARTY OF as hashing and the like.

and the property control of the property of th In accordance with the invention herein, a self-referential data set is used that metrile, typice registers for the appropriate and a bispection as an ero becomes facilitates the determination of whether the entirety of the data set is present, without the use of out of band data and without the use of cryptographic functions, such as a hash function. If the ashipted to give that the required discouraging stay. For example, this the entirety of the data set is not present, subsequent processing of the data items of the data set is terminated. In the context of digital audio recordings, a compliant playback or ું મારું <del>જાયું</del> છે. કર્યકા કરાકા કરાકા પ્રાપ્ય માટે માટે કે ફ્રોલ્ટ લાબાલા જ વાર્કે છે. પ્રાપ્ય દેશો છે. recording device is configured to refuse to render an individual song in the absence of the The transfer was a very surprise to entire contents of the CD. The time required to download an entire album on a CD in make be the wife the later of is a many were secured a second a second way uncompressed digital form, even at DSL and cable modem speeds, can be expected to be View for the life, we see that the cold that the life is the life in the life is the life in the life in the life is the life in the life in the life is the life in the life in the life is the life in the life greater than an hour, depending upon network loading and other factors. Thus, by requiring that the entire contents of the CD be present in uncompressed form, at a download "cost" of a ni mare graden de oración de la bacalação de facilies na mái lagra e f over an hour, the likelihood of a theft of a song via a wide-scale distribution on the Internet is อาเอส ของให้สำนัก และ เพลาะ substantially reduced.

the manifest make the more a subsection of the day of provincious and the first carries of the FIG. 1 illustrates an example block diagram of a protection system 100 in athering as a Comment of a accordance with this invention. The protection system 100 comprises an encoder 110 that encodes content material onto a medium 130, and a decoder 120 that renders the content BEARING MARK AND LOOP OF HE LEAD TRANSPORTED BY THE DR. THE DESCRIPTION OF THE PARTY OF THE PROPERTY OF material from the medium 130. The encoder 110 includes a selector 112 that selects content the wastern and the second property the same material from a source SRC, a binder 116 that builds an entirety verification structure, and a recorder 114 that records the content material onto the medium 130. The selector 112, for The court for a 1 10 pm but of a to sign forms example, may be configured to select content material corresponding to songs that are being ಶಾರ್ಯಗ್ರಹ್ಮದಲ್ಲಿ ಬಹ್ಮ ಕಟ್ಟಿಗಳು ಪರ್ಮಾಣಕ compiled into an album. For ease of reference, each selected content material item is termed A P. T. COMMING TO THE REPORT OF THE PROPERTY a "data item", and the entirety of the data items forms a "data set". Each data item comprises one or more sections of data that form the data item, the totality of sections also forming the parateristic in the transfer of the parateristic on the parateristic in the paraterist "data set". The binder 116 creates a data structure consisting of links between sections of the or medical case of the managery, the electrical data set, by means of which the entirety of the data set can be verified. Preferably, each See to been seed by weare very metric authorizing the constraint set on a conservable or very the file section's link is bound to the section via the use of one or more watermarks. The recorder 114 ses y a labora, or sest proposed that is hardy to be used a correct the transmiss of the appropriately formats, encodes, and stores the data set, with the aforementioned data VI Masaraha off to tage occasions of the assault Of Linubocashi to standard to structure, on the medium 130, using techniques common in the art.

Here size of the consumous at the misses of In accordance with this invention, the selector 112 selects data items to be added to the data set until the size of the data set is deemed large enough to discourage a subsequent transmission of the data set via a limited bandwidth communications channel.

This "discouraging size" is a subjective value, and will depend upon the assumed available ម៉ា ស្ថមស្រី ដែលបើស អាច ស communications bandwidth, the loss incurred by the transmission, and so on. Other criteria may also be used to determine whether to add additional data items to the data set. For 二次人的主机物学做出产的主义的主义的主义的 example, if the data items correspond to songs of an existing album collection, all of the songs will typically be added to the data set, regardless of whether the size of the data set has grant the restaurable of the first than exceeded the determined discouraging size. If all of the songs of the album collection have Californi votani. Poli neminari been selected, and the discouraging size criterion has not yet been reached, other data items are selected to accumulate the required discouraging size. For example, data items comprising random data bits may be added to the data set to increase its size. These random bits will typically be stored as out of band data, CD-ROM data, and the like, to prevent it Lead of the Late to home a second of from being rendered as audible sounds by a conventional CD player. Alternatively, the data ស៊ីនៃក្រៅពីស្រាប់ស្រាប់ក្រ សម្រែកដូចស្វា items may comprise other sample songs that are provided to encourage the sale of other สามารถท้อง จะที่ เพษายา และไท กับ ทำ เปลี่ยนก albums, or images and video sections related to the recorded content material. Similarly, ng refliger department of the period of the control of the period of the control promotional material, such as Internet access subscription programs may also be included in the recorded information on the recorded medium. These and other means of adding size to a State of the first state of the second of data set will be evident to one of ordinary skill in the art in view of this invention.

radir ora Mirch miraco The decoder 120 in accordance with this invention comprises a renderer 122 is increase, it and preventions when and a gate 124 that is controlled by an entirety checker 126. The renderer 122 is configured to (divided to a regional constitution of the constitution of the second production). retrieve information from a medium reading device, such as a CD reader 132. As is common on the first first that the same of the country of ाद्वार <sub>देशी</sub> बुद्ध गाउँ <u>विशेष</u>ीर तर भूता है । in the art, the renderer 122 retrieves the information by specifying a location index, and in 维持中国的国际生产的 2000年 response, the reader 132 provides the data located at the specified location index on the For the Brown History and all mon medium 130. Block reads of data at contiguous locations on the medium 130 are effected by STATE OF STANDING specifying a location index and a block size.

The dotted lines of FIG. 1 illustrate an example song extractor 142 that

25 extracts a song from the medium 130 and communicates it to an example CD imitator 144,

representative of a possible illicit download of the song via the Internet. The CD imitator 144

represents, for example, a software program that provides information in response to a

conventional CD-read command. Alternatively, the information received from the song

extractor can be written to a CD medium, and provided to the conventional CD reader 132.

30 As noted above, the song extractor 142 is likely to be used because the transmission of the

entirety of the contents of the medium 130 is assumed to be discouraged by the purposefully

large size of the contents of the medium 130.

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assigned to the linked-to section, as well as its link address and associated random number. The random number associated with the linked-to section that is contained in the start section andara Market er er er er er er is compared with the random number contained in the linked-to section. If the random numbers are not equal, subsequent processing of data items in the data set, such as the rendering of a song, is terminated. As noted above, other linked-identifier techniques may also be used, such as storing a random number in one section, and a function, such as a hash, of this number in the linked-to section. If an alternative encoding scheme is used, the nd to the light a countries sold gold on CD out it has not leaded a d is of normal before comparison is modified accordingly.

If the section-identifiers are found to be equivalent, the process continues, by advancing to the linked-to section. The above section-identifier matching is continued for each subsequent linked-to section, until sufficient confidence is gained that the entirety of the data set is present. In this embodiment, absolute confidence can be gained by continuing until the linked-to section becomes the original start section, indicating that all links in the closed linked list have been processed. The reading of each watermark, however, is time consuming, and a substantial delay before the rendering of a song may be unacceptable to consumers. In a preferred embodiment, the rendering of the song begins immediately after a few successful random number matches. Thereafter, if the rendering system is able to read information from the medium faster than is required for rendering the material, additional linked-to section watermarks are read and verified, and the rendering is terminated if and when a mis-match is on their product in the registral programment to be a passed for their programment of the second of the second found.

Other data structures and corresponding encoding and decoding processes will be evident to one of ordinary skill in the art in view of this invention. FIG. 4 illustrates an and the control of the sample of control of the control of alternative data structure 600 that uses randomly linked pairs of sections to verify the presence of an entirety of the data set. In FIG. 4, each section 620 has an associated linked-to William State of the Mark to 25 section L 634 and an associated random number R 636. In this example alternative embodiment, the linked-to section 620' has a linked-to section L 634' that points back to the linked-from section 620. That is, the linked-to addresses L 634, 634' form a linked pair of ery of the place of this ease in the consections 620, 620'. In this data structure, a common random number R 636 is assigned to each section of the linked pair of sections 620, 620'. To determine whether an entirety of the re to be selected man but tention by tended to the feath and we consider a select the entering of the education. data set is present, randomly selected sections are tested by verifying that each section's vinconnece our sizes remaining these to decising guied the meshadi to decising the leading to the random number at its linked-to section. It is assumed herein that the range, or approximate range, of the section addresses can be determined, so that the soft grant addresses can be determined, so that the soft grant addresses are soft as a viable section on the recorded medium. For example, the table of contents of the medium may be used to determine the viable track addresses.

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assuming that the table of contents has an embedded fragile watermark, or other security device, that can be used to determine the validity of the table of contents. If a range cannot be determined, the first randomly selected section will be from the track selected for rendering. In this manner, if a malicious party uses a song extractor 142 (FIG. 1) to "rip" a song from a CD, and communicates it, in compressed or uncompressed form, via the Internet, a verification of the links will result in a "track-section not found" response from the CD reader 132 or CD imitator 144 for any link in the sections of the song that link-to a section of another song in the original data set. If the CD imitator 144 substitutes a bogus section in response to this verification request, the bogus section will not contain the appropriate random number watermark, and the entirety checker 126 will preclude further renderings of the ripped song.

Regardless of whether the selected song is used to generate the first section for verification, absolute certainty that all sections are present can be achieved by maintaining a list of tested sections, and verification continued until all section-pairs are tested. This

15 approach assumes that the range of the section addresses can be determined or estimated, so that a truncation of the data set can be detected. In the case of the selected song being used to initiate the verification, the range of the section addresses can be assumed to be continuous through the range of link addresses in the selected song. For example, if one of the link addresses is track 10, section 9, a verification of each section 0 through 9 of track 10 can be made, and a verification of section 0 of tracks 0 through 10 can be made. These and other techniques for filling in a search area will be evident to one of ordinary skill in the art in view of this disclosure.

In a preferred embodiment, to minimize the time required to effect the determination that the entirety of the data set is present, random section pairs are tested until sufficient confidence is gained to justify the determination, with substantial statistical certainty. That is, for example, if only half the data set is actually present, the random selection of the first section, from within the total range of all sections, is likely to detect an absence of this section 50% of the time; if this section is present, the likelihood of its linked-to section being present is 50%. Thus, a successful pair-test provides 75% confidence that at least half the data set is present. Each successive test increases either the confidence level or the expected proportion of the data set being present, or both. Statistical tests are commonly available for determining an appropriate number of pair-test to achieve a desired level of confidence that a given proportion of the data set is present. In a typical embodiment, the

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- 5. The method of claim 4, wherein creating the closed linked list includes a random selection.
- 6. The method of claim 1, wherein assigning the link address (230) to each section includes

- 7. The method of claim 1, further including:
- assigning a verification parameter (332) to each section of the plurality of sections (220), to facilitate a subsequent verification that each section corresponding to each link address (230) is a valid section.
- 8. The method of claim 7, further including:
  encoding the link address (230) of each section and the verification parameter
  (332) as one or more watermarks that are embedded in the section.

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- 9. The method of claim 8, wherein the one or more watermarks include:
- a robust watermark that is configured such that a removal of the robust watermark causes a corruption of data contained in the section, and a fragile watermark that is configured such that a modification of the data contained in the section causes a corruption of the fragile watermark.
- 25 10. A method of decoding content material from a source comprising:
  reading one or more first entirety parameters (230, 332, 336) associated with a
  first section (220) of a data set,

the one or more first entirety parameters (230, 332, 336) comprising a link address (230) to a second section of the data set,

reading one or more second entirety parameters (230, 332, 336) associated with the second section of the data set, and

decoding subsequent sections of the data set in dependence upon the reading of the one or more second entirety parameters (230, 332, 336).

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the one or more second entirety parameters (230, 332, 336) include a section verification parameter (332), and

the decoding of the subsequent sections is dependent upon the section verification parameter (332).

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The method of claim 11, wherein the section verification parameter (332) comprises a random number that is associated with the second section when the data set is created.

- 10; with payers the end over the end of the accordance of the company of the farmer of the end of t 1) ( The method of claim 10, further including reading subsequent entirety parameters (230, 332, 336) associated with other sections of the data set, based on the reading of the second entirety parameters (230, 332, 336), and the metrody of the artist of
- see 15 and the local process wherein the second seems that the second seems to be seen as the second seems to be seems to be seen as the second seems to be

the decoding of subsequent sections of the data set is in further dependence upon the reading of the subsequent entirety parameters (230, 332, 336).

14. The method of claim 13, further including

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restricted for the same of the returned properties with

- 20, determining when the reading of the subsequent entirety parameters (230, 332, 336) includes a completion of reading of all sections of the data set.
  - The method of claim 10, further including 15. rendering content material corresponding to the subsequent sections of the
- 25 data set.
- The method of claim 10, wherein June De Cherth Landame hall the one or more second entirety parameters (230, 332, 336) are embedded in the second section as one or more watermarks.

 $rac{30}{2}$  and the course second and ray quarkers (2.1). If  $t \in \mathcal{C}(\mathcal{A})$  is a consideration of The method of claim 16, wherein the section nations become out this. the one or more watermarks include:

a robust watermark that is configured such that a removal of the robust watermark causes a corruption of data contained in the second section, and

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this establish one of the control of a fragile watermark that is configured such that a modification of the data contained in the second section causes a corruption of the fragile watermark. 100 美元·马马克·斯二克亚马克基德克克克奇克

A storage medium (130) that is configured to contain content material, the Confidence, with Moses per Constitution for the storage medium (130) comprising

a data structure (200, 300) that includes:

a plurality of sections (220), and

one or more entirety parameters (230, 332, 336) corresponding to CALINIA MORES ES ESCUESTA each section of the plurality of sections (220),

10 wherein

the one or more entirety parameters (230, 332, 336) include a link address (230) that links the corresponding section to an other section of the plurality of sections (220) to facilitate a determination of whether an entirety of the plurality of sections (220) is present on a subsequent copy of at least a portion of the plurality of sections (220). and the control of the same control of the control

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The Aid as probability (1000) applicately in a support to be cope since An encoder (110) comprising:

eddraga megaleur amine ekangelingen er eers a selector (112) that is configured to select data items (210) comprising a data of many (((f. )) that when the first best free in the man (b. ) In the basic virts, the is set so that an accumulated size of the data set is sufficient to discourage a transmission of the to serve more to transfer the recover with the or or the properties the properties of the contract of the properties of data set via a limited bandwidth communications charnel,

ma mām mi to pilatot, matemitas papa a papija o te STANGO ENDROY AND E each data item of the data items (210) comprising one or more Miller, councerie affaires la elaboration facilità ann en la co sections (220),

a binder (116) that is configured to associate a link address (230) to each section of the data items (210) comprising the data set, the link address (230) corresponding to an other section of the data items (210) comprising the data set, and

- the opening to the control of the property of the state of the control of the con a recorder (114) that is configured to record each section and each associated link address (230) to a medium (130) to facilitate a subsequent rendering of the data items (210) in dependence upon a presence of one or more of the other sections of the data items s where it, we have 1983) televish is (210) corresponding to the link address (230) of one or more sections (220) of the data set. क्यों के के राज्य में क्यों हैं कि है। एक अर्थ के अर्थ के किसी किसी है किसी कर कर की की किसी कर की
- alda bolakulardi el mili (1.29), u arbara grimpilikoa naja bipari arbinulu esano ando aresan The encoder (110) of claim 19, wherein ear's are vea the binder (116) is further configured to associate the link address (230) to each section via a random process.
  - 21. The encoder (110) of claim 19, wherein

the binder (116) is further configured to associate a section verification ide The Middle parameter (332) to each section, and 医抗乳质试验 医乳毒素皮质 医多糖硷 网络风格马斯 鹼

the recorder (114) is further configured to record the section verification parameter (332) with each section to facilitate a verification that the section is present in the subsequent rendering of the data items (210). 化电子混合物的 的复数电流电路

or and high Per Miller and received 22. The encoder (110) of claim 19, wherein ริเทรา รู้บ่าวริวายและเสียต่องได้ หูหล้วย สุนาย the binder (116) associates the section verification parameter (332) to each

section based on a random process.

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23. A decoder (120) comprising:

a renderer (122) that is configured to receive data items (210) corresponding to a data set, and to produce therefrom a rendering corresponding to a select data item, and could be not be able to the first of the

each data item of the data items (210) including one or more sections

(220), thereby forming a plurality of sections (220) comprising the data set, 15

> each section of the plurality of sections (220) including a link address gen (j. 1.) grava i sk

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(230) corresponding to an other section of the data set, and

ો કાઈએ જો તેમ તો અને લે જિલ્લાની છેલ્લ સાથી છે an entirety checker (126), operably coupled to the renderer (122), that is configured to preclude the rendering corresponding to the select data item in dependence นี้ เพราะ จุดีเฉพาะสำนัก ขาว ผู้ถายน้ำในการเพรา upon a presence of one or more of the other sections corresponding to the link address (230) 一类 有一个人的现在分词 网络多种种植物的 機能能 机砂煤板 木 of one or more sections (220) of the plurality of sections (220).

and the result had to read up a supple so reflective a 24. The decoder (120) of claim 23, wherein
the entirety checker (126) is further configured to determine the presence of all
other sections corresponding to the link address (230) of all sections of the plurality of The contract of the first of the contract of the contract of the contract of

The field is a consequence of the control of COO and the control of the control o

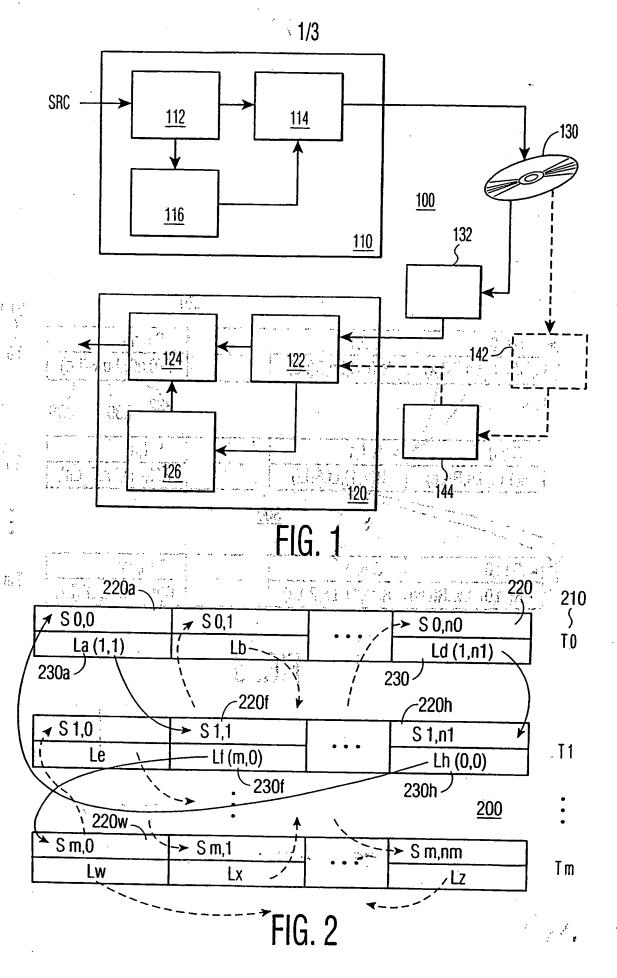
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- 25. The decoder (120) of claim 23, wherein the entirety checker (126) is further configured to verify the presence of the
- 30 one or more other sections based on a verification parameter (332) that is associated with reversity of the control of the control of each section.

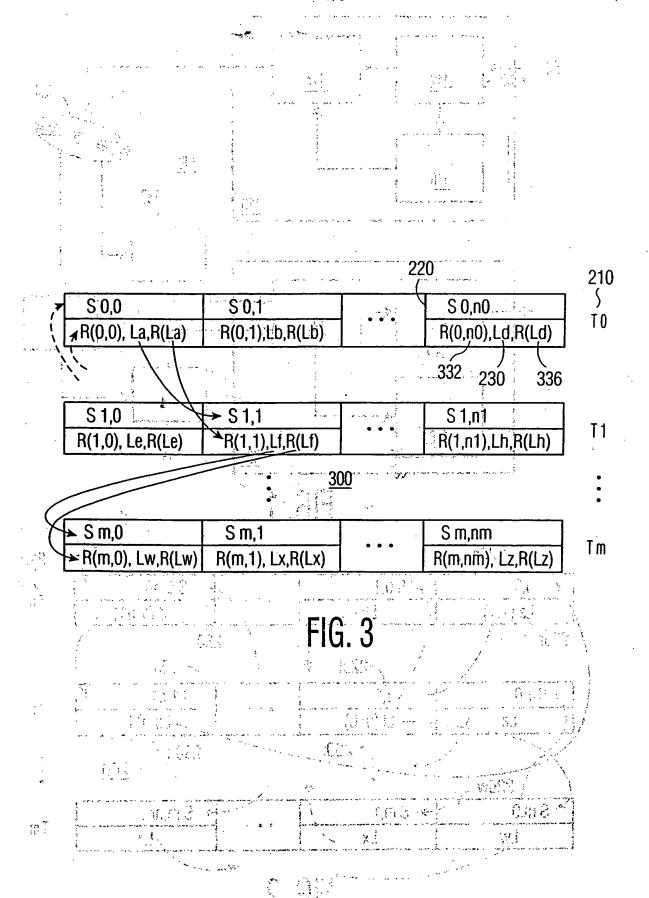
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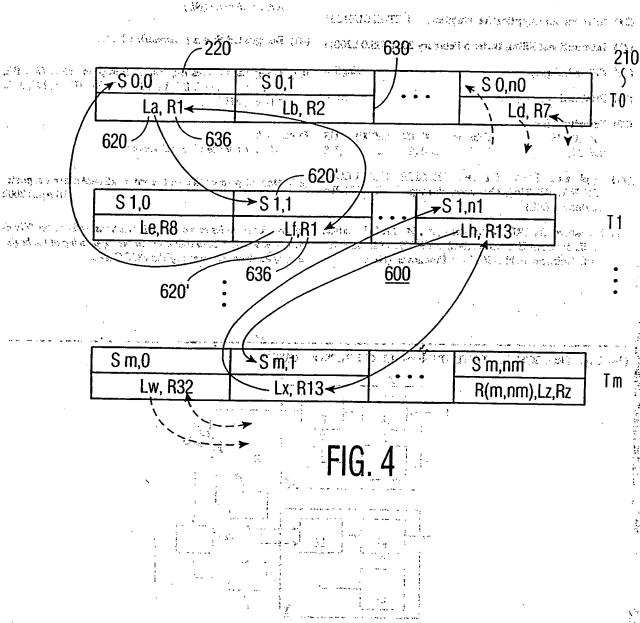


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## (12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

## (19) World Intellectual Property Organization International Bureau 🚅



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(43) International Publication Date 9 August 2001 (09.08.2001)

**PCT** 

(10) International Publication Number WO 01/57867 A3

(51) International Patent Classification?: G06F 1/00, G06T 1/00, H04N 5/913

G11B 20/00.

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(21) International Application Number:

PCT/EP01/01207

(22) International Filing Date: 5 February 2001/(05.02.2001)

(81) Designated States (national): CN, JP.

(25) Filing Language:

(26) Publication Language:

English

English

(84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,

NL, PT, SE, TR).

(30) Priority Data:

60/180,838

7 February 2000 (07.02.2000) US

Published:

with international search report

09/537,079 28 March 2000 (28.03.2000) US

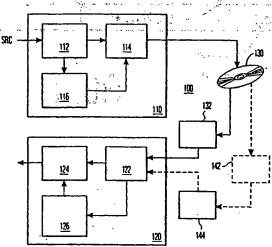
(71) Applicant: KONINKLIJKE PHILIPS ELECTRON-ICS N.V. [NL/NL]; Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(88) Date of publication of the international search report: 18 April 2002

(72) Inventors: STARING, Antonius, A., M.; Prof. Holstlaan For two-letter codes and other abbreviations, refer to the "Guid-Prof. Holstlaan 6, NL-5656 AA Eindhoven (NL).

6, NL-5656 AA Eindhoven (NL). EPSTEIN, Michael, A.; ance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

#### (54) Title: PROTECTING CONTENT FROM ILLICIT REPRODUCTION



(57) Abstract: A sufficient number of data items are selected (112) for inclusion in a data set so as to discourage a transmission of the entire set over a limited bandwidth communications path (130), such as the Internet. Each data item comprises one or more sections, which taken together constitute the complete data set. Each section of the data set is linked to another section of the data set, and each section's link is bound to the section via the use of one or more watermarks. Upon presentation of material for rendering, the presence of the entirety of the data set is verified (126) by ascertaining the presence of linked-to sections. For further security, the links between sections is formed by a random selection of each linked-to section. To verify that each linked-to section corresponds to the original section that was linked-to, each link contains an identifier of the linked-to section that can be used to determine that a retrieval of a linked-to section corresponds to the originally assigned linked-to section. If the identifier associated with the linked-to section does not properly match the presented linked-to section, a rendering of the data items of the data set is prevented. In a preferred embodiment, a closed linked list is formed, so that every section of the data set can be included in the verification process,



## INT INATIONAL SEARCH REPORT

Intern. nal Application No

PCT/EP-01/01207 A. CLASSIFICATION OF SUBJECT MATTER IPC 7 G11B20/00 G06F1/00 G06T1/00 H04N5/913 50 \$600 克克雷 15 下 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) collins, S., This is a religion of the P. IPC 7 G11B G06F The State of the State of the State of Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, WPI Data, PAJ, IBM-TDB, COMPENDEX, INSPEC ultinity i side C. DOCUMENTS CONSIDERED TO BE RELEVANT. Category \* Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. WO 99 45704 A (KONINKL PHILIPS ELECTRONICS NO MAES MAURICE J J J B (NL); PHILIPS Decree to the state of the s 1,10,18, 19,23 10 September 1999 (1999-09-10) the whole document MAES M ET AL: "EXPLOITING SHIFT 1-3,10, INVARIANCE TO OBTAIN A HIGH PAYLOAD IN 18,19,23 DIGITAL IMAGE WATERMARKING" PROCEEDINGS OF THE INTERNATIONAL CONFERENCE ON MULTIMEDIA COMPUTING AND SYSTEMS. June 1999 (1999-06), pages 7-12, XP000939264 Eindhoven, The Netherlands the whole document Further documents are listed in the continuation of box C Patent family members are listed in annex. 'Special categories of cited documents : later document published after the international filing date or priority date and not in conflict with the application but document defining the general state of the art which is not cited to understand the principle or theory underlying the . considered to be of particular relevance "E" eartier document but published on or after the international "X" document of particular relevance; the claimed invention cannol be considered novel or cannot be considered to document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another involve an inventive step when the document is taken alone document of particular relevance; the claimed invention ; cannot be considered to involve an inventive, step when the document is combined with one or more other such document. citation or other special reason (as specified) "O" document reterring to an oral disclosure, use, exhibition or ments, such combination being obvious to a person skilled in the ad. document published prior to the international liting date but later than the priority date claimed \*&\* document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 30 August 2001 06/09/2001 Name and mailing address of the ISA **Authorized officer** European Patent Office, P.B. 5818 Patentlaan 2 NL: - 2280 HV Rijswijk Tel. (+31-70) 340-2040. Tx 31 651 epo ni. Fax: (+31-70) 340-3016 Schiwy-Rausch, G. of the party of the property of the state of

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